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Sen. J. F. Kennedy

U S S R N A T I O N A L A F F A I R S

19 October 1967

WORLD-WIDE ACCLAIM FOR SUCCESS OF VENUS-4

CPSU, Scientists' Congratulations

Moscow Domestic Service in Russian 1500 GMT 18 Oct 67 L

[Text] To the CPSU Central Committee, the Presidium of the USSR Supreme Soviet, and the USSR Council of Ministers:

The collectives of scientists, designers, engineers, technicians, and workers which took part in creating and preparing the launch and flight of the automatic interplanetary station Venus-4 are happy to report to our own Communist Party and the Soviet Government that for the glorious 50th anniversary of the Great October Socialist Revolution yet another important task of the party and government has been fulfilled.

For the first time in the history of interplanetary space research the Soviet automatic station Venus-4, successfully launched on 12 June this year into a heliocentric orbit, has reached the planet Venus and today, 18 October 1967, made a smooth descent to its surface. A scientific laboratory has been sent to Venus, which, for the first time, has permitted research to be carried out in the very atmosphere of the planet. Unique scientific data has been received.

As all the Soviet people, we are proud that the first automatic station to reach the surface of Venus, as the first station to make a soft landing on the moon, was created and launched in the Soviet Union. The flight of the automatic station Venus-4 has solved one of the most complex technical tasks of interplanetary communications, opening a new page in the conquest of the cosmos around the sun. We who took part in creating the automatic station devote this outstanding achievement of Soviet science, in mastering interplanetary space, to the 50th anniversary of the Great October Socialist Revolution. We assure the CPSU Central Committee and the Soviet Government that the scientists, designers, engineers, technicians, and workers will continue to devote all their efforts to the peaceful conquest of interplanetary space for the glory of our socialist motherland and for the benefit of all mankind.

To the scientists, designers, engineers, technicians, and workers, to all collectives and organizations which took part in creating and launching the automatic interplanetary station Venus-4:

Dear comrades, today, 18 October 1967, for the first time in the history of cosmonautics the Soviet automatic interplanetary station Venus-4 landed a scientific laboratory on the surface of Venus which successfully completed a complex of scientific research into the atmosphere of the planet and its surface. A second pennant with the insignia of the USSR has been delivered to Venus. The automatic station Venus-4 entered the atmosphere of Venus, with its second cosmic velocity, and then, after aerodynamic breaking by a special parachute system, landed on the surface of the planet and consequently completely completed the program of scientific research. The successful flight to the planet Venus by the automatic station and the carrying out of most important scientific experiments is a new, outstanding achievement of Soviet science and technology, a most important contribution to world science.

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The new victory in the cosmos is a remarkable gift to the 50th anniversary of the Great October Socialist Revolution, clear proof of the flourishing of the creative forces of the Soviet people, the growth in the might of our motherland, and the advantages of socialism. All the Soviet people are proud that the victory in the cosmos was achieved by the talents and labor of Soviet scientists, designers, engineers, technicians, and workers, who solved the most complex scientific and technical problems to insure the unprecedented flight of the automatic station to Venus. This great achievement in the investigation of the planets of the solar system and the cosmos confirms again that our scientists, designers, and workers are fulfilling, according to plan, the tasks set before them by the 23d CPSU Congress.

The CPSU Central Committee, the Presidium of the USSR Supreme Soviet, the USSR Council of Ministers, and all the Soviet people fervently and heartily congratulate the scientists, designers, engineers, technicians, workers, and the collectives and organizations which took part in the planning, creating, launching, and completion of the flight of the automatic station Venus-4, which for the first time made a smooth descent to the surface of Venus.

(signed) The CPSU Central Committee; the Presidium of the USSR Supreme Soviet; and the USSR Council of Ministers.

Pravda Special Edition

Moscow Domestic Service in Russian 1530 GMT 18 Oct 67 L

[Review of PRAVDA special edition]

[Excerpt] The issue is devoted to the new outstanding achievements of Soviet science. The paper frontpages the TASS announcement on the smooth descent of Venus-4 on Venus. For the first time the world is hearing signals from another planet. Valuable data has been received on the physical and chemical properties of Venus' atmosphere. One of the pictures, carried by the edition, shows the "culprit" of the event, our new interplanetary station Venus-4.

Alongside the picture, the edition carries a selection of first reactions. It includes an interview with Cosmonaut Pavel Romanovich Popovich and commentaries by foreign scientists: Astonishing! Fantastic! Judging by the data received, we have recorded signals from the surface of Venus!, exclaimed the director of Jodrell Bank, Prof Bernard Lovell, speaking to a PRAVDA correspondent.

It is obvious that Russia has scored another success--such is the reaction of U.S. space specialists. The landing of the station on Venus, they stress, gives the Russians big advantages in the exploration of space. The position at present is such, they stress, that a wide field of activities opens before the Russians in the field of exploring Venus, where they have, in fact, no competition.

U.S. Reaction

Moscow TASS International Service in English 1918 GMT 18 Oct 67 L

[Text] New York--U.S. space experts acknowledged today that the soft landing of Venus-4 on Venus was a tremendous scientific and technological feat. administrator James Webb said that "to go from Sputnik-1 to Venus-4 in 10 years illustrates the powerful base of technology being developed in the Soviet Union."

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Webb added: "The fact that this has been accomplished in connection with the 50th anniversary of the Communist Revolution is intended to encourage those in and out of the Soviet Union to believe that the use of rocket technology to master and use the newly opened environment of space can become a major factor in the balance of technical power among nations. In my view this accomplishment will convey the intended message."

Dr Edward Welsh, principal White House adviser on space programs, said that the soft landing of Venus-4 indicates that the Soviet Union is "deeply interested in a planetary program and gives it very high priority." The Soviet Union, he declared, has "contributed very much to what we know about Venus."

Al Rossiter Jr, UPI space writer, writes that "the historic soft landing of a Russian-built instrument package on Venus gives the Soviet Union at least a six-year edge over the United States in planetary exploration." He declared that the "success of Russia's Venus-4 probe will overshadow the less spectacular results expected from America's Mariner-5 spacecraft when it passes within 2,500 miles of Venus on Thursday."

[The Moscow Domestic Service in Russian at 1900 GMT 18 October adds that "U.S. Vice President H. Humphrey, who is also chairman of the National Council for Aeronautics and Space Exploration, stated in connection with the landing of the Soviet automatic station on Venus: The treasure of mankind's knowledge will be considerably enriched. Yet another step, a very important step, has been taken into outer space."]

Petrov on Basic Problems

Moscow TASS International Service in English 1607 GMT 18 Oct 67 L

[Text] Moscow--The successful conclusion of the flight of the automatic station Venus-4 is opening a new era of detailed exploration of planets of the solar system, Boris Petrov, academic secretary of the department of mechanics and guidance processes of the USSR Academy of Sciences, said in a TASS interview. "After today's achievements, we are entitled to expect new successes in the conquest of space."

This successful experiment was made possible by the successful solution of two extremely complex problems. One of them was development of a reliable guidance system and transmission of command impulses from the earth which insured the incredible accuracy of the landing. The second was development of instruments which measured the parameters of the Venusian atmosphere directly by physical methods.

Academician Petrov remarked that the information sent back by Venus-4 confirmed to a considerable degree the information obtained by observations from the earth. Specifically this concerns the planet's temperature, whose maximum reading of 280 centigrade is close to the conjectured 300 degrees.

The information about the pressure, temperature and chemical composition of the Venusian atmosphere could be obtained only if the landing was very smooth, Petrov said. On approaching Venus the automatic station had the escape velocity which it was extremely difficult to reduce at such a distance from the earth. [as received]

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Popovich on Future Tests

Moscow TASS International Service in English 1254 GMT 18 Oct 67 L

[Text] Moscow--Cosmonaut Pavel Popovich said that the landing of the Soviet automatic station on Venus today is "a new step toward the stars."

"The experience of the first decade of space exploration enables us to say that man will explore the space around the sun in the lifetime of our contemporaries," Popovich told a TASS correspondent. "No one can say precisely just when the first man will fly to Venus, but this will happen without a doubt," the cosmonaut said. "Man will undoubtedly get into the distant space," Popovich said. He said that practical preparations for this were recently discussed at the 18th International Astronautical Congress in Belgrade, Yugoslavia.

Among the mysteries of Venus which have to be fathomed, Popovich mentioned, above all, the nature of the substances it is made of and its internal structure. "And finally, one of the most exciting questions is whether some life exists on Venus. All this will have to be surveyed by cosmic devices which will be sent to Venus," the cosmonaut said.

In August 1962, Pavel Popovich made 48 orbits around the earth in a Vostok-4 spacecraft.

Martynov on 'New Tasks'

Moscow TASS International Service in English 1952 GMT 18 Oct 67 L

[Text] Moscow--The landing of Venus-4 supplied science with facts "which make us believe in the power of hypotheses concerning the planets of the earth group," Prof Dmitriy Martynov, director of the Shternberg Astronomical Institute, said in a TASS interview. "The unique information sent back by the station confirmed our theoretical predictions concerning the temperature and atmospheric pressure on the surface of Venus and the chemical composition of its atmosphere," he explained.

Martynov believes that "this experiment will give a great boost to the development of theory in the near future." It is a pressing task to produce persuasive hypotheses explaining the temperature on the surface of Venus. "Until now many astronomers believed that high temperature was associated with the planet's atmosphere," he said. "Now that we know that it is the temperature of the surface itself, a new riddle has arisen."

Venus-4 'Couple' Experiments

Moscow TASS International Service in English 0800 GMT 19 Oct 67 L

[Text] Moscow--The high reliability of Venus-4 was the primary task of our work, the chief designer of the Soviet interplanetary station which soft-landed on the surface of Venus on Wednesday said in an interview to a correspondent of the newspaper KOMSOMOLSKAYA PRAVDA.

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All instruments, units, and systems of the station were checked in the conditions close to those in space. The testing of the Venus-4 backup were the most interesting, said another maker of the station. The backup survived the "launching" and the entire "flight." It made it possible to detect certain defects and remove them before the real launching. After 12 June when the station was launched, the backup made it possible to make a prognosis as to what would be happening to Venus-4 after certain intervals of time. The backup is a precise replica of the station, only it carries additional pick-ups which increase its "sensitivity."

The entirety of Soviet experience in launching interplanetary stations was utilized to design this station. The main purpose of Venus-4 was to determine the physical conditions of the atmosphere of Venus. At the same time, it had to perform a series of in-flight observations. "We have been receiving scientific information on space along the entire 'road' to Venus," the chief designer said.

Venus-4 has delivered to the planet the second pennant, a star-shaped object with the Soviet Union's state emblem on its one side, and the station's path, the inscription "Venus-4" and date on the other. The first pennant was delivered to the "morning star" by Venus-3 on 1 March 1966.

The builders of the station would like to believe that there is life on Venus, although they hold different views on this score. "There is life on Venus maybe in different forms unlike terrestrial ones," one of them, a woman, said. "Some primitive forms, perhaps unicellular organisms, but nothing like civilization." "There is life, undoubtedly, in other solar systems; but in our system we are the only ones," said a third man.

The journalists asked those interviewed to forecast to journalists the year of the first manned expedition to Venus. The chief designer believes that man will go there in 1980. Other replies were: 1985, 1990, 1995, and 2007.

More on Venus-4 'Double'

Moscow Domestic Service in Russian 2000 GMT 18 Oct 67 L

[Head of KOMSOMOLSKAYA PRAVDA's science department Vladimir (Gubarev) talk]

[Excerpt] The chief designer of Venus-4 told us yesterday that probably the most interesting aspect of the work with Venus-4 were the tests which took place long before the launching of it and which are proceeding now. Long before 12 June, the day when a space rocket put the Venus-4 station into interplanetary trajectory, another station was created, a double of Venus-4. The double was placed in a special chamber, in which space conditions which the real station would meet on its way to Venus were created. The double has lived through the launching and the whole flight. The experiment which took place today was fully copied. In this way designers were able to check the equipment of the station and the work of the whole complex. The main thing is that the earthly flight of the Venus-4 double enabled us to establish any shortcomings and remove them long before the real launching took place. After 12 June this work did not end; it continued, sometimes lagging behind the real one and sometimes overtaking it. In this way it gave us an opportunity to respond to what would happen to Venus-4 at a given moment of time and to various phenomena at different stages.

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PRAVDA on Details of Venus-4

Moscow TASS International Service in English 1708 GMT 18 Oct 67 L

[Reportage from the plant where interplanetary stations are made]

[Text] Moscow--The scientific laboratory that was detached from the automatic station Venus-4 had to enter dense layers of the atmosphere at the second cosmic velocity, withstand fantastic stresses, burn, but not to ashes, open a parachute, land on water, if it exists on Venus, and not sink or land on rocks and not fall to pieces.

A report from the plant where the interplanetary station Venus-4 was made is published in today's special edition of PRAVDA. The scientific laboratory landed today on the surface of Venus and measured the pressure, density, temperature, and the chemical composition of the planet's atmosphere.

On earth the scientific laboratory was tested in a centrifuge. Its weight was increased several hundred times over; tremendous loads weighed down on every bolt and every wire. After this a team of assemblymen would carefully take off the lid, the parachute concealed under it, and the white mirror of the directed antenna and attentively inspected them to see if everything had withstood, here on earth, the encounter with Venus.

The detachable apparatus is covered with a dark-caked layer--the sublimating layer. This layer is to evaporate in the roaring flames when the apparatus enters the Venusian atmosphere. The layer will burn out but it will also protect the laboratory from temperature of several thousand degrees. The designers of Venus-4 spent much time solving the problem of how to insure a hundred percent guarantee that on landing on Venus the parabolical antenna would point toward the earth. To prevent the apparatus from being overturned by winds they resorted to a blasting off of the parachute system. What if the station would land on its side? The designers distributed the payload in such a way that the station would always regain its stand position.

Venus-4 also needed sugar. One of the designers told us that the station would not sink in water and even in benzine. But if the apparatus landed in some lighter liquid environment, the sugar lock would spring into action. The lock would melt and the spring, held back firmly by compressed sugar on land, would uncoil and push the antenna to the surface.

New super--light and super--strong metals and new optical instruments and electronic logic units were used in the latest Venus probe.

Designers spent also much time on the system of thermal regulation in the compartments of the orbiting apparatus, the one which was to carry the scientific laboratory to the upper layers of the Venusian atmosphere and then shoot it in the direction of the planet, while burning to ashes in the atmosphere itself. A definite temperature had to be maintained in the compartments of the orbiting apparatus so that earth could maintain communications with it, control its flight and, if the need arose, to help it. This was a difficult task because one side of the station was heated tremendously by the sun, while the other was ice-cold. A compact, simple and, what was most important, extremely reliable system of ventilating the compartments was required. And such a system was devised.

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Designers also searched for something that would sharply decrease the amplitude of the scientific laboratory's oscillations during its entry into the atmosphere. The plant produced an original and simple dampener of oscillations.

Scientists had to solve also the problem of thermal insulation of the orbiting apparatus. This insulation was to deflect sun rays to the maximum and at the same time bring down to the minimum the drain of warmth from the station itself. Otherwise, everything would either burn or freeze. The correspondent was shown a broad tape covered with a silvery foil. This tape does not waste warmth, does not absorb it and preserves all of it much better than the eiderdown in sleeping bags, better than the dog's fur used to line boots in the Arctic and Antarctica. Specialists say that this material, especially developed for the space station, would make excellent clothing for people who work in the coldest parts of our planet.

The paper publishes photographs of the scientific station descending on a parachute, adjustment of the radio antennae of Venus-4, as well as the second pennant with a gold Soviet coat of arms delivered to the surface of Venus.

IZVESTIYA on In-Flight Conditions

Moscow TASS International Service in English 1943 GMT 18 Oct 67 L

[Text] Moscow--Engineer A. Serov writes in IZVESTIYA today that the data of the functioning of the various systems in the Venus-4 automatic interplanetary station will help design better space vehicles in the future. In developing Venus-4, the designers used the valuable experience of such automatic interplanetary stations as sonde, Venus-2, and Venus 3.

The most important states of the flight of Venus-4 were the course correction and the actual landing. Course correction makes it possible to compensate the mistakes inevitable in launching a vehicle on a flight to another planet. "The course correction was an important task of the scientists and engineers controlling the flight of Venus-4 along its interplanetary trajectory."

Considerable time had to be devoted to other problems too. During the flight there were over a hundred communication periods with Venus-4. They were used to check the functioning of on-board systems, receive information about the physical conditions in the station's various compartments, measure trajectorial parameters, and receive the first information about space sent back by the station.

The station's power supply system consisted of panels of solar elements and a buffer chemical accumulator. At present this system is "the optimal for long-distance space vehicles," the engineer writes. As the intensity of solar radiation is not constant--it is inversely proportional to the square of the distance from the sun--the regime of the work of the solar elements had to be changed on the second month of flight.

The crucial stage of the flight came on the immediate approach to the planet. It was important, Serov writes, that the communication session at this stage should start at a particular moment and when the automatic interplanetary station was in a particular spot relative to the planet Venus and the Earth.

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If a conventional session may be shifted in time within fairly broad limits, the beginning of a close-to-the-planet session is strictly confined to a definite period of time.

The author stresses that the information obtained by the station "will enable the planning of future programs of deep space probes with more confidence."

Venus-4 Communications

Moscow TASS International Service in English 1744 GMT 18 Oct 67 L

[Text] Moscow--There were 114 communication periods with the automatic interplanetary station Venus-4 before the final "talk" with it, the TASS correspondent reports from the long-distance space communication center.

The sensitivity of the receiving antenna which made this contact possible is tremendous. It can detect the energy of a lighted match at a distance greater than that between the earth and the moon. This receiving antenna at the long-distance space communication center consists of eight parabolic cups. Each of them is 16 meters in diameter. The entire antenna weighs about 1,500 tons. The accuracy with which it has to be moved is staggering. A mistake of only one arc second would mean a miss of 300 kilometers at the distance to Venus--80 million kilometers.

The end of the four-month journey approached and the time came for the scientific estimates and engineering solutions to undergo their crucial test. Members of the state commission, scientists and engineers--creators of the Venus-4 station--assembled at the command center. The control panel flashed with multicolored lights--blue and green pulses on the screens of oscillographs and the red lights of relays.

At 0542 hours Moscow Time the signal of Venus-4 reached the antennae on earth. The near-planet communication session with the automatic station began. At 0449 hours [as received] tiny rocket engines, that are smaller than a human hand and whose thrust is measured in grams, began to turn the station in such a way that it would take a definite position in respect to the sun and the earth.

The authors of the orientation system worried the most, for all their calculations were being checked. A huge rhombus signal appeared on the screen showing that the station "saw" the earth and that the directional parabolic antenna had been switched on. The intensity of the signal immediately jumped up 300 times compared with that received by the nondirectional antenna. The long distance space communication center was flooded with information about the functioning of all systems of Venus-4 and data about the space through which it was hurtling.

This was a busy time for the ballistics specialists. With the measurements at their disposal, they had to determine the station's orbit with great accuracy. It should be recalled that the principal astronomic unit, the distance from the earth to the sun, is not yet accurately known. Estimates vary by hundreds of kilometers. When the station was far from Venus, this did not matter. But just before the descent to the surface of the planet the most accurate information was required.

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It was the Doppler effect that came to the assistance. It is known that the greater the speed of an apparatus emitting radio signals, the greater the displacement of the frequency of the signal. And this displacement can be used to gauge the speed and the stability of the flight.

The clock showed 0700 hours. The counters of the frequency adjustment system, which changed the parameters of the receiving antenna all the time so as to keep track of the change in the signal produced by the increase in speed, ticked away faster; the pull of Venus was making itself increasingly felt; the speed was growing; it was only 15,000 kilometers to the planet. At 0725 hours Moscow Time the center sent its last command: to switch on the programmed timing device. The station became fully autonomous. It was to land on the mysterious planet all by itself.

Excited, the scientists watched for the signal of the parabolic antennae to disappear when the station would enter the atmosphere of Venus and detach the scientific payload.

Some 400 to 500 kilometers remained to the planet. At that time scientific information of immense value was already streaming from the station. All previous achievements in the studies of Venus were surpassed. At 0734 hours the historic event occurred. The signal of the parabolic antennae disappeared. A sphere detached itself from the orbiting station and leaped into the unknown, into the depths of Venusian atmosphere. Now everything depended on the reliability of the station's automatic systems.

After the lid opened and a parachute billowed in the skies of Venus, the envoy of the earth began slowly to descend on the surface of the planet. Simultaneously, antennae spread out and signal streamed toward the earth. The signal was received very well, it was only five times weaker than the one transmitted by the directional antennae. The blue beam of the oscillograph recorded information which had so far been denied to astronomers. The radio signals carried to earth information about the pressure, density, and temperature of the atmosphere of Venus, the most mysterious planet of the solar system.

The Soviet automatic station Venus-4 was the first in the world to achieve a smooth descent and landing on the surface of Venus.

Siforov on Venus-4 Communications

Moscow TASS International Service in English 0932 GMT 19 Oct 67 L

[Text] Moscow--"The transmission of information from the Soviet station Venus-4 is the greatest victory for science and engineering," said Dr Vladimir Siforov, a prominent specialist on long distance communications. The scientist was commenting at TASS request on the successful landing of Venus-4 on the mysterious planet.

Dr Siforov said that the Soviet scientists who accomplished radio location of Venus arrived at the conclusion that its surface consists of solid rocks whose physical properties resemble those of the silicates of the earth.

But these and some other conclusions on the nature of the Venus surface drawn on the basis of the radio location data "call for checking which can be carried out only with the help of automatic stations which will transmit information from the surface of the planet."

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Reliable and effective transmission of information over great distances was described by Vladimir Siforov as one of the biggest problems of space exploration. He said that in the first space experiments, the range of space radio communication was hundreds and thousands of kilometers, whereas in subsequent launchings it already exceeded a hundred million kilometers. In experiments carried out by the USSR Academy of Sciences in locating Jupiter, radio signals sent from Earth and reflected back, travelled about 1.2 billion kilometers. "The range of space radio communication is steadily increasing," the scientist said.

Breathtaking prospects for a still more effective system for transmitting information from space are opening up with the application(?and) use of the methods and means of quantum electronics, specifically quantum generators of optical and other ranges which make it possible to obtain extremely narrow beams.

Venusian Atmosphere

Moscow TASS International Service in English 1820 GMT 18 Oct 67 L

[Text] Moscow--Early in the morning of 18 October the magnetometer of the Soviet interplanetary station Venus-4 reported that the station was approaching the planet. The slight increase in the intensity of the magnetic field detected by the instrument at the approaches to Venus was not subsequently confirmed and the question of the existence and magnitude of the magnetic field around the planet is thus still to be decided after a careful processing of the data telemetered to earth.

Another sensation of the day, according to the TASS correspondent at the coordinating-computing center, was the news that immediately after separation the instruments container began a rapid analysis of the principal characteristics of the Venusian atmosphere. This period of scientific measurements of unique scientific importance lasted one and a half hours.

According to preliminary data the Venusian atmosphere, according to instrument readings, consists nearly completely of carbon dioxide. Instruments detected oxygen within limits of 1.5 percent. No nitrogen was detected, while water vapors were in insignificant quantities.

"An end to Venusian hypotheses," stated one of the Soviet scientists conducting this experiment. He thus characterized the first data produced by the direct probing of the Venusian atmosphere. There will be less fantasies now about the mysterious neighbor of the earth," and not such a mysterious one after all after today, he added.

It was difficult task to develop an apparatus for landing on Venus that could cope with the conditions it could encounter on the planet according to the very contradictory information available about it. Suffice to say that in some respects, as it turned out today, its "endurance" was several times greater than actually required. This applies specifically to its resistance to temperature.

A leading authority at the coordinating-computing center said that the rapid increase in temperature, as the station dipped deeper and deeper into the Venusian atmosphere, did not in any way affect the station, and its standard of performance remained high throughout the entire period planned for the analysis of the physical conditions in the Venusian atmosphere. In the 90 minutes of descent, the temperature outside the station rose from 40 to 280 degrees centigrade.